PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to Continuous Toothed Belts

We, PNEUMATIQUES, CAOUTCHOUC MANUFACTURE ET PLASTIQUES KLEBER-COLOMBES, a French Body Corporate of, 15 Rue des Sablons, Paris, France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

The present invention relates to a method of manufacturing continuous toothed belts comprising a textile or metallic reinforcement by casting in a mould of material which may become sufficiently fluid and may then solidify. A toothed belt, is a belt of which one surface has teeth which co-operate with the teeth of at least one toothed pulley of a transmission gear. The present invention also relates to belts manufactured by this method.

It is known that in order to manufacture belts by casting in a mould, different materials such as polyvinyl-chloride, polyamides, polyesters, polyethers, polysulphides and other elastomers may be used.

In order to put and maintain a reinforcement member in position, several methods have previously been proposed. In one of these methods, an internal core has projections, the shape of which may vary and on which a reinforcement member is wound. In this case, instead of forming a cylinder, the reinforcement member forms a polyhedron and this deformation continues throughout the completed belt. When the belt is wound on the pulleys, the reinforcement member is bent around the edges of the polyhedron, which is a cause of the wear and tear.

According to another method, the belt is manufactured by double moulding. Firstly, a sleeve is produced by moulding, and on this sleeve the reinforcement member is wound: the belt is completed during a second moulding operation. In this method, the reinforcement member is wound under tension on a material which is not rigid and which is compressible. The result is that the position of the reinforcement member in the belt is generally not the exact position required. However, it is known that for belts, particularly toothed belts, it is absolutely necessary that the reinforcement member be positioned very exactly.

An object of the present invention is a method of manufacturing belts by casting, which enables a reinforcement member to be positioned very exactly, whilst giving it a cylindrical shape.

The invention consists in a method of producing a continuous toothed belt by moulding, wherein a material which is solidified by cooling or which hardens during polymerisation by heating is cast into the space between a reinforcement wound on a central core and an annular part concentric with said core, the central core is withdrawn and is replaced by another central core having a diameter smaller than the first, and a material which solidified by cooling or which hardens during polymerisation is cast in the space between said other core and the reinforcement.

In order that the invention may be more clearly understood, reference will now be made to the accompanying drawings which show one embodiment thereof by way of comparison with known arrangements, in which: —

Figure 1 shows a part cross-section of a mould as previously used,

Figure 2 shows a section through a belt produced by a mould of Figure 1,

Figures 3 and 4 show how the central core only may be with-drawn according to the invention,

Figure 5 shows a section through one form of belt made according to the invention, and

Figures 6 and 7 illustrate further mould forms.

Referring now to the drawings, as may

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Price 25p Price 7½p Price 30p

be seen in Figure 1, which represents schematically a partial transverse section of a mould utilised in a known method of manufacture, the mould is constituted by an internal core 1 and an annular part 2 internally grooved at 4. The core 1 is made of a rigid substance, for example a metal, and it is cylindrical and smooth. The annular part 2 is concentric with the core 1 and the parts are centred and held in position by known means. A reinforcement member is placed on the central core 1, said reinforcement being for example, a metal or textile wire 3 wound helically under tension. It will be noted that since the core 1 is smooth and incompressible, the reinforcement member forms a true cylinder and that this cylinder has the exact diameter required.

A substance which solidifies whilst remaining sufficiently supple is cast into the space 4 between the core 1 and the annular part 2.

Polyesters such as these sold under the Trade Mark VULKOLLAN, polyethers such as those sold under the Trade Mark ADIPRENE, and polyamides such as Nylon or those sold under the Trade Mark RILSAN, have been found to be suitable substances for casting. These substances are simply cast in the space or they are inserted by compression, or by injection.

Previously to this operation and, if necessary, the reinforcement member may have been subjected, before or after being placed on the core 1, to any known and suitable treatment so that there is a good adherence between the reinforcement member and the substance introduced into the space.

After the material has been cooled or polymerised, the core 1 and the annular part 2 are moved; thus a sleeve is obtained from which belts or the desired width are cut which are turned round so that the teeth which are the driving elements, are shown on the inside.

A belt of this type is shown schematically in longitudinal section in Figure 2. It comprises the reinforcement 3 which is completely visible and only one layer 5 of the material. If desired, the reinforcement member may be protected by applying a thin protective layer, such as for example a film or a polyurethane varnish.

By putting a method of the invention into operation it is also possible to manufacture a belt which, as shown schematically in longitudinal section in Figure 5, comprises a layer 6 of material above the reinforcement 7.

For this, the method indicated previously is effected, but instead of withdrawing the central core and the annular part, only the central core is with-drawn. An operation of this type may be effected in the manner shown schematically in Figures 3 and 4, where a reinforcement member 7 is wound on a central core 8 which is surrounded by an annular part 9 which is concentric therewith. In a space 10 between the core 8 and the annular part 9, the material which has been solidified by being cooled, has been cast. Concentrically with the annular part 9 and with the central core 8, a ring 11 is placed on the annular part 9, the internal diameter of which is slightly greater than that of the central core 8 and smaller than the diameter of the assembly formed by the central core covered by the reinforcement member and the external diameter of the ring 11 is such that it rests to a great extent on the annular part 9. When this ring 11 is rigidly held in position, a pull is exerted on the core, as is shown by the arrow 12 (Figure 3) so that the central core 8 slides out, while the annular part 9, the reinforcement 7 and the solidified material remain in position.

When the central core 8 has been withdrawn it is replaced by a central core having a smaller diameter. This is shown in Figure 4 which is a partial schematic section of the mould utilised during this second phase. It comprises the same annular part 9 as previously, which is covered by a layer of material holding the reinforcement member 7. The central core 13 has a diameter smaller than that of the core 8, the difference between the radii of these cores corresponding to the thickness of the layer 6 of the belt shown in Figure 5.

Of course, if desired, any known suitable treatment permitting a good adherence to be obtained with the material which will be subsequently cast as is described later, may be effected on the reinforcement member and the material before the core 13 is put in position. For this, the material holding the reinforcement member may be separated from the annular part 9 and it may be replaced in position after the treatment has been effected.

A material which is solidified by cooling or which hardens during polymerisation by heater 9 is cast into the space between the core 13 and the reinforcement 7. Then the core 13 and the annular part 9 are removed. A sleeve is thus obtained from which belts having the desired width are cut and are then turned round because they have been moulded on the reverse side. The belt thus produced, as shown in Figure 5, has a reinforcement member which is exactly cylindrical.

A toothed belt of this type may also be manufactured, by moulding it directly on the correct side.

As is shown in Figure 6, which is a partial schematic section through a mould utilised during the hereinafter described operation, a reinforcement member 14 is wound on a central core 15 which is

cylindrical and smooth. The annular part 16 is also cylindrical. Into the space between the annular part 16 and the core 15, a material is cast which is solidified by cooling. The core 15 is then withdrawn and replaced by a central core 17 which is grooved, the grooves corresponding to the teeth of the completed belt. The maximum diameter of the core 17 is smaller than than the diameter of the core 15. A material is cast in the space between the core 17 and the reinforcement 14 which is located on the previously cast material, which material is solidified by cooling. The annular part 16 and the core 17 are withdrawn and the sleeve obtained cut up into belts having the desired width.

WHAT WE CLAIM IS:—

1. A method of producing a continuous toothed belt by moulding wherein a material which is solidified by cooling or which hardens during polymerisation by heating is cast into the space between a reinforcement wound on a central core and an annular part concentric with said core, the central core is withdrawn and is replaced by another central core having a diameter smaller than the first and a material which is solidified by cooling or which hardens during polymerisation, is cast in the space between said other core and the reinforcement.

2. A method as claimed in claim 1, wherein the central core utilised during the second casting is grooved.

3. Methods for producing a continuous toothed belt, substantially as hereinbefore described with reference to Figures 3, 4, 6 and 7 of the accompanying drawings.

4. A continuous toothed belt, substantially as hereinbefore described wiht reference to Figure 5 of the accompanying drawings.

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1 SHEET This drawing is a reproduction of the Original on a reduced scale

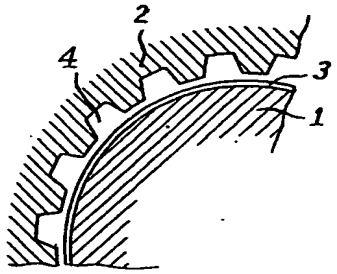

Fig. 1

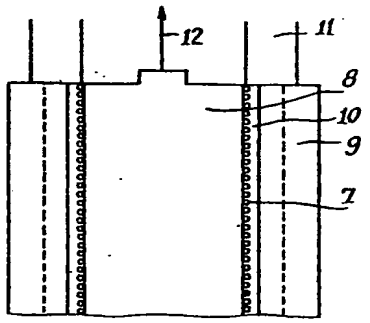

Fig. 3

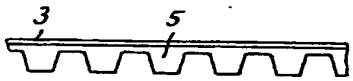

Fig. 2

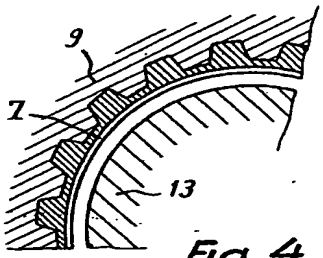

Fig. 4

Fig. 5

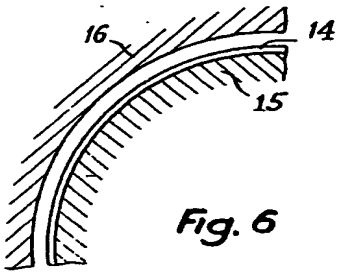

Fig. 6

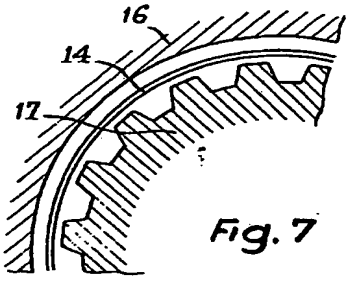

Fig. 7